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MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—Still another attempt to arrive at a just view concerning the chemical relations of eruptive rocks has been made, this time by Lang.[2] Calcium and the alkalies are regarded as the best indicators as to the relationships of the rock masses, and in this respect the new investigation departs widely from older ones, in which the silica was always considered as perhaps the most characteristic of a rock's chemical constituents. After citing a large number of analyses of rocks chosen from carefully examined types of all classes, the author divides rock magmas into four great groups, viz: Those in which the proportion of K_2O present exceeds that of CaO and Na_2O combined, or $K_2O > CaO + Na_2O$, and those in which the proportions of the components correspond to the following formulæ: $Na_2O >$, $CaO + K_2O$, $Na_2O + K_2O > CaO$ and $CaO > K_2O + Na_2O$. Each of these groups is then subdivided into types. In the first group, for instance are two orders in one of which $Na_2O > CaO$, and in the other $CaO > Na_2O$. In the first order fall the Cornwall granites with $CaO : Na_2O : K_2O = 1 : 4 : 14$; the Heidelberg porphyry with an alkali ratio of 1 : 1.5 : 8; the dyke granite type with a ratio of 1 : 3.7 : 6, the granite-rhyolite type with a ratio of 1 : 2 : 4, and the orthophyre type with 1 : 3.8 : 7.3. The second order includes the Hesse granite, syenite and bolsenite, with the respective alkali ratios $CaO : NaO : K_2O = 2 : 1 : 6$, 2.5 : 1 : 4 and 1.9 : 1 : 4.8. The other groups are likewise subdivided into orders, and in each of these are ranged the types. Brief notes accompany the descriptions of each type, and a table giving the percentages of the principal constituents of 247 fresh rocks closes the paper. Some of the relationships brought to light by the author's discussion are so unexpected that it may safely be affirmed that the views put forth in his article will meet with much opposition among petrographers. The granites, for instance, are discovered to occur in different orders, under different groups, the types being often further removed from each other than are normal granite and phonolite.——The new rock iolite, described by Ramsay and Berghell[3] fills the place in Rosenbusch's scheme that was left for the plutonic equivalent of the nephelinites. It is a medium to coarse-grained granular rock forming a large portion of the Mountain Iiwaara in the parish of Kunsamo, Finland.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Min. u. Petrog. Mitth. xii, p. 199.

[3] Geol. Fören. i. Stockholm Förh. 13, 1891, p. 300.

It consists essentially of nepheline and pyroxene, with iiwaarite (a titaniferous garnet), apatite, sphene and cancrinite. Its structure is allotriomorphically granular, though the pyroxene often possesses one or more crystallographic faces. In the finer grained varieties the garnet is not common, but in the coarse-grained phases of the rock it occurs in large quantity. The pyroxene is zonal, with an almost colorless nucleus, surrounded by six or seven colored zones, in which the extinction is high and the color some shade of green. The mineral occurs either as isolated grains in the nepheline or in little nests of grains in this mineral. Cancrinite is not present in all sections, but in many it is abundant as a decomposition product of nepheline. The relationship of the iolite to nephelinite is shown not only in its possession of a titaniferous garnet, but in its chemical composition as well:

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	P_2O_5	Loss	Total
Iolite.........	42.79	1.70	19.89	4.39	2.33	.41	11.76	1.87	9.31	1.67	1.70	.99	= 98.81
Nephelinite	43.89	1.24	19.25		12.00		10.58	2.81	9.13	1.73	1.39		=102.02

——In consequence of a recent expedition into the Peninsula of Kola, in Northwestern Russia, the senior[1] of the two authors last mentioned has had an opportunity to make a partial geological examination of this little-known territory. He finds the greater portion of the peninsula to be underlain by gneisses, mica schists and Devonian sedimentary beds. The mountains in the neighborhood of Lake Imandra are composed largely of an eleolite syenite, consisting of an intergrowth of albite and microline, eleolite, aegirine, arfvedsonite, eudialite, ainigmatite and a number of other rare and some new species. The aegirine forms long prisms whose extinction is about 4–5° and whose optical angle exceeds 114°. Sometimes a nearly colorless zone surrounds a dark-green kernel, but usually the prisms are dark throughout. An analysis of isolated material gave:

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MnO	MgO	Na_2O	K_2O	Loss
51.82	.60	21.02	8.14	3.01	1.00	1.47	11.87	.85	.50

The arfvedsonite is rare in the normal rock, but is common in its peripheral phases in prismatic grains, whose extinction is 10°30′. The eudialite often possesses an idiomorphic outline bounded by OR, R and ∞P_2. Its double refraction is usually positive, but occasionally some portions of its grains are negative and other portions isotropic.

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[1] Fennia. Bull. d. la Soc. d. Géog. de Finlande, 3, No. 7, p. 1.

This phenomenon leads the author to the assumption that eudialite and eukolite are the end members of an isomorphus series, of which the isotropic substances intermingled with the eudialite are intermediate members. Ainigmatite is found only in the peripheral masses as allotriomorphic grains with a pleochroism A = black > B = brown-red > C = carmine. One of the new minerals occurring in the coarse-grained rock has the composition:

SiO_2	Al_2O_3	Fe_2O_3	MnO	CaO	MgO	Na_2O	K_2O	H_2O
55.88	15.19		2.67	9.53	.53	9.06	1.57	6.04

It is isotropic or weakly doubly refracting. It shows no cleavage, is hard, and has a density of 2.753. Its color is light-red except in certain star-like areas where it is more deeply colored. It is one of the youngest of the rock's components. In the normal rock these constituents are so aggregated as to produce the trachytic structure. In the peripheral varieties aegirine, nepheline and the feldspars are in two generations. These minerals and eudialite occur as phenocrysts in a fine-grained green ground mass of the first three mentioned components, sodalite and the new minerals above referred to. The structure of this aggregate is intermediate between the hypidiomorphic and panidiomorphic. A dyke eleolite syenite from the same region has a thoroughly panidiomorphic ground mass.——In the course of a very exhaustive geological article on Mite Vulture, in Basilicata, Italy, Deecke[1] describes the products of the volcano as lavas and tufas. The former, with the exception of the hauyne-trachyte of Melfi, all possess a similar appearance. They are dark, compact or slaggy rocks with phenocrysts of augite and hauyne in a ground mass of leucite, nepheline, feldspar, augite, biotite, melilite, containing sometimes olivine, garnet, apatite and magnetite. The augite is in well formed idiomorphic crystals, both in the lavas and in the tufas. These are zonal with a yellow augite surrounded by a greenish zone, the material of which also separates as small crystals in the ground mass. The hauyne is the next component in abundance. It possesses the usual characteristics of this mineral, and alters into zeolites, of which the most important is natrolite. The leucite, nepheline, plagioclase and sanidine are usually in such small grains as to be visible only under the microscope. The latter mineral occurs also as an essential constituent in 1 cm. long crystals in the phonolite of LeBraidi, East of Melfi, and in some of the tufas. Olivine is found only in the rock of the crater and in bombs, though it was probably more abundant during the first stages of consolidation of nearly all the lavas. Melilite and biotite are also rare, and both seem to have undergone more or less resorption. In addition to the minerals above mentioned bronzite is sometimes found in the olivine inclusions, and natrolite, phillipsite, gypsum, serpentine and kaolin as alteration products of other minerals.' The most abundant lava of the volcano is leucite-tephrite, with nepheline, leucite, plagioclase and sanidine in varying proportions. A phonolite dyke was discovered at LeBraidi, as already stated. Otherwise phonolitic material is known only as tufa. At Melfi occurs the unique rock, many times described as a melilite hauynophyre. According to the author it should be classed as a hauyne-melilite-nepheline-leucite-tephrite. Basanites cut the older tephritic lavas in the crater of the volcano. Glassy base was detected only in some of the lapilli. The bombs thrown out during the active period of the volcano's history are either olivine bombs or aggregates of augite, biotite and hauyne. In the former the components are olivine, bronzite and biotite, the latter in micropegmatitic intergrowths with the other two. The tufas fall into two classes. In one sanidine and melanite are abundant; in the other hauyne predominates. The first is the older, and includes the trachyte tuffs of earlier authors. It is a tephrite tufa, which sometimes contains little rounded grains of quartz. The hauyne tufa is more widely spread than the tephritic varieties, and is probably connected genetically with the phonolitic lava.

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[1] Neues. Jahrb. f. Min., etc., B. B. vii, p. 556.

Mineralogical News—General.—Analyses of *långbanite* having led Flink to the complicated formula $37\,Mn_5\,SiO_3 + 10\,Fe_3\,Sb_2\,O_8$ as expressive of its composition, Backström[1] has thought it worth while to re-examine the mineral in the attempt to learn its true relationship to other nearly allied species. A new analysis yielded him:

Sb_2O_5	SiO_2	MnO	FeO	CaO	MgO
13.96	9.58	65.44	3.10	1.73	.53

Since chlorine is evolved when the mineral is treated with hydrochloric acid, the author concludes that the manganese is principally in the form of Mn_2O_3, while the remainder of the metal is present as MnO. The conclusion reached is to the effect that langbanite is not isomorphous with any known mineral, but is an isomorphous mixture of Mn SiO_3, Mg SiO_3 and Mn SbO_3.——A large number of *chlorite* analyses are communicated by Ludwig,[1] to whom material was furnished by Teshermak. Among the varieties whose composition was determined are *pennine,* from the Zillerthal, *cronstedtite,* from Pribram, *korundophilite,* from Chester, Mass., *metachlorite,* from Elbingerode, *daphnite,* from Penzance, *tabergite,* from Taberg, *prochlorite,* from the Zillerthal and the Fischerthal, *leuchtenbergite,* from Amity, N. Y., and *clinochlor,* from Achmatowsk, Russia, and from Kariet, Greenland. The figures for korundophilite and leuchtenbergite follow:

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[1] Zeits. f. Kryst., xix, p. 276.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	H_2O	Sp. Gr.
Korund............ ...	23.84	25.22	2.81	17.06	19.83	11.90	2.87
Leucht...............	30.28	22.13		1.08	34.45	12.61	2.68

These analyses of Ludwig and others that have recently been reported have afforded Tschermak[2] data for the elaboration of a theory concerning the constitution of the chlorites, according to which the members of this group of minerals are regarded as consisting of mixtures of six molecules, four being represented by the known minerals serpentine, amesite, strigorite and chloritoid, and the other two being hypothetical. Dr. Clarke[3] takes exception to Tschermak's views and shows that upon his own theory (that the chlorites are substitution derivatives of normal salts) the composition of these complicated minerals becomes simple, and that his theory is as closely in accord with the facts known as to the structure of the chlorites, as is the theory of the Vienna mineralogist.——In a discussion as to the relations of the recently discovered minerals pinakiolite and trimerite to well known groups Brögger[4] places the former among the rhombic aluminates, and the latter, as a pseudo-hexagonal species, between the olivine and the willemite groups. He further points out the similarity in morphological properties between all of these groups and ascribes their differences to morphotropic action. He regards all the silicates of the general formula R_4SiO_4 as composing a morphotropic group, in which trimerite is triclinic because R is replaced by two elements, viz: Be and Mn—Several *micas, vermiculites,* and *chlorites*[5] have been investigated by Messrs. Clarke and Schneider[6] by the

[1] Min. u. Petrog. Mitth. xii, p. 32.

[2] Akad. d. Wissens. in Wien. , 1891.

[3] Amer. Jour. Sci., xliii, 1892, p. 190.

[4] Zeits. f. Kryst., xviii, p. 377.

[5] Cf. Becke: Min. u. Petrog. Mittl., xi, p. 259.

[6] Amer. Jour. Sci., Sept., 1891, p. 242.

methods[1] already noted in these pages. Some of the vermiculites seem to be composed simply of mica molecules, while in others these are intermingled with molecules possessing the characteristics of those of chlorite. Many analyses of vermiculites appear in the paper, and all of them bear evidence of careful work.——*Calcium-vanado-pyromorphite*[2] occurs in the Leadhills, Southern Scotland, as black masses with an irregular fracture. It melts easily to a brown crystalline enamel, and dissolves in hydrochloric acid, leaving a brown residue. Its density is 6.9–7.0, and in composition it is a pyromorphite with its lead and phosphorus partly replaced by calcium and vanadium.——

$Pb_3(PO_4)_2$	$Pb_3(VO_4)_2$	$Ca_3(PO_4)_2$	$PbCl_2$	$Cu(OH)_2$	Insol.
52.00	19.20	15.80	11.05	1.50	0.6

Crystallographic.—*Barite* crystals from veins cutting limonite and siderite, forming lenticular masses in limestone, interstratified with crystalline schists at Huttenberg, Saxony, have been studied by Brunlechner[3]. They are supposed to have originated by the leaching of barium silicate and its decomposition through the agency of carbonic acid into barium bicarbonate and silica, and by the further action of iron sulphate upon the barium salt. Well formed crystals are rare, but the author has succeeded in detecting upon them twenty-nine forms, of which the following are new: $\infty P\breve{\tfrac{11}{4}}$, $\infty P\breve{22}$, $\infty P\breve{30}$, $\infty P\breve{44}$, $\infty P\bar{\tfrac{6}{5}}$, $16P\breve{\infty}$, $20P\breve{\infty}$ and $4P\bar{\tfrac{7}{4}}$.——An examination of the crystals of *ullmanite* from Sardinia, in the possession of the British Museum, inclines Miers[4] to regard them as interpenetration twins of tetartohedral forms, whose apparent holohedral symmetry is due to twinning about the dodecahedral axis. If this is so, ullmanite is the first regular tetartohedral mineral known.——Melville[5] has investigated the diaspore crystals in the cavities of the quartz diaspore rock of Mt. Robinson[6]. One type consists of light-brown transparent forms, elongated parallel to *c*. Its planes in the order of their development are $\infty P\breve{\infty}$, ∞P, $\infty P\bar{2}$, $\infty P\bar{\tfrac{4}{3}}$, $\infty P\bar{\tfrac{7}{6}}$, $P\breve{\infty}$, P and $P\bar{2}$, with the axial ratio $= .6457 : 1 : 1.0689$. A second type comprises almost white, opaque crystals with a stout pyramidal habit, bounded by $\infty P\bar{2}$, $P\bar{2}$ and $\infty P\breve{\infty}$.——A very elaborate paper on the *vesuvianite* crystals in the serpentine of Testa Ciarva, Alathal, Piedmont, adds but little to our knowledge of these. The results recorded in it but confirm Zepharovich's observations. The crystals examined by the author, Strüver[1], numbered 123, each one of which was carefully measured, both as regards its dimensions and the planes occurring upon it. The number of forms found on each crystal is stated, and the number of crystals upon which each form was observed is mentioned. A plate appended to the article contains thirty-two figures, showing the arrangements of striations and the shapes of elevation and depression figures on the different faces.——In the second part of his article on the symmetry of crystals Beckenkamp[2] gives us some exact information concerning the vicinal planes and the etched figures of the *aragonite* of Bilin and the neighboring localities in Russia, and discusses the polarity of the crystal molecule, with especial reference to the explanation of the electrical properties of the carbonate and of its vicinal planes. The axial ratio of the aragonite crystals examined is .6228 : 1 : .7204.——In a recent article Sohncke[3] explains the structure of circularly polarizing crystals on the basis of his point-system theory of crystal-structure. He succeeds in showing that circularly polarizing crystals may be regarded as composed of thin lamellæ of doubly refracting substance, in which the different layers are revolved a certain number of degrees around their common axis.——Some very complicated twins of feldspar from the Pantelleria rocks are described by Foerstner[4]. They exhibit in the same group combinations of all the principal twinning laws known for the species. ——The *calcites* of fifteen localities in Baden have undergone the same exhaustive examination in the hands of Sansoni[5] as have those of so many other well known occurrences.——Miers[6] has measured the fourth crystal of *krennerite* ($Au_3\,Ag_3\,Te_6$) reported in mineralogical literature. It is from Nagyag, Hungary, and contains six new forms, viz.: $2P_{\breve{\infty}}$, $3P_{\breve{\infty}}$, $4P_{\breve{\infty}}$, $2P_{\breve{2}}$, $3P_{\breve{2}}$ and $\frac{1}{2}P_{\breve{2}}$. The axial ratio is 1.0651 : 1 : .5388.

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[1] AMERICAN NATURALIST, 1891, p. 830.

[2] Collie: Jour. Chem. Soc., lv, 1889, p. 91.

[3] Min. u. Petrog. Mitth. xii, p. 62.

[4] Min. Magazine, ix, p. 211.

[5] Am. Jour. Sci., June, 1891, p. 470.

[6] Cf. AMERICAN NATURALIST, 1892, p. 166.

Miscellaneous.—Following the work of Clarke and Schneider on the constitution of the natural silicates comes the report of a series of investigations on similar bodies made by Thugutt[1] in Dorpat. The author recounts the results of his experiments of digesting certain compounds with water and various chemicals for a long time at a high temperature, and describes minutely the products formed. By using the proper ingredients a series of sodalites was produced, in which sodium silicate, the corresponding selenite, sulphite, chlorate and other salts take the place of the chloride in the most common sodalite. The details of the experiments cannot be given, although they are extremely interesting. The formula thought to represent best the chemical properties of natural sodalite is $4(Na_2O, Al_2O_3, 2SiO_2) + 2\,NaCl$. The treatment of corundum, a few silicates and natural glasses with water and alkaline carbonates shows clearly that each reagent is efficient in hydrating the substances upon which it acts. Many other conclusions of interest are reached through the author's investigations, but they cannot be mentioned here for lack of space.

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[1] Neues. Jahrb. f. Min., 1891, p. 1.

[2] Zeits. f. Kryst. xix, 1892, p. 241.

[3] Ib., xix, p. 530.

[4] Ib., xix, p. 560.

[5] Ib., xix, p. 321.

[6] Miner. Magazine, ix, p. 182.

BOTANY.

Myriostoma coliforme Dicks. in Florida.—A note upon the rare occurrence of *Geaster coliformis* may be seen in the ninth volume of Grevillia. It was found in England and first recorded in Ray's Synopsis in 1724; with long intervals it has been seen a few times since. It has been met with in a few localities on the continent. When I wrote the article on N. A. Geasters in THE AMERICAN NATURALIST in 1884, I was not aware that *Myriostoma coliforme* had ever been found in this country, but that paper brought out the fact that a specimen which came from Colorado was in the N. Y. State Museum of Natural History. This I noticed in the Journal of Mycology, Vol. I, No. 1.

Last summer Prof. L. M. Underwood found a nest of this rare and curious fungus in the vicinity of Eldorado, Fla. Through his kind consideration and liberality, I have come into possession of three specimens.

As no account of the internal structure has ever been given, I was eager to examine its interior and proceeded shortly to carve the largest specimen. A study of this enables me to fortify the opinion of Desvaux that this interesting species of the tribe *Geaster* should of itself constitute an independent genus. But let us examine it carefully beginning with the mycelium and the external surface.

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[1] Mineralchemische Studien, Dorpat, 1891, p. 128.